StorCase® Technology

Data Silo®
DS560/DS570

SCSI-IDE RAID Enclosures

User's Guide

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SCSI-IDE RAID Enclosures

User's Guide

Part No. D89-0000-0203 A04 January 2003

StorCase Technology, Inc.
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Phone (714) 438-1850 Fax (714) 438-1847

LIMITED WARRANTY

STORCASE TECHNOLOGY, Incorporated ("StorCase") warrants that its products will be free from defects in material and workmanship, subject to the conditions and limitations set forth below. StorCase will, at its option, either repair or replace any part of its product that proves defective by reason of improper workmanship or materials. Repair parts or replacement products will be provided by StorCase on an exchange basis, and will be either new or reconditioned to be functionally equivalent to new.

This warranty does not cover any product damage that results from accident, abuse, misuse, natural or personal disaster, external power surge or failure, or any unauthorized disassembly, repair or modification. StorCase will not be responsible for any software, firmware or other customer data stored within, or interfacing with a StorCase product.

Duration of Warranty

Seven-Year Warranty: The following StorCase products are covered by this warranty for a period of seven (7) years from the original date of purchase from StorCase or its authorized reseller: all Data Express® removable device enclosures and all StorCase interface cables and accessories specifically intended for use with these products. Data Silo®, Data Stacker® and InfoStation® products are covered by this warranty for a period of seven (7) years, excepting the RAID controller, power supply, fan and blower components, which are covered by the three-year warranty described below.

Three-Year Warranty: The following StorCase products are covered by this warranty for a period of three (3) years from the original date of purchase from StorCase or its authorized reseller: all Rhino®*JR* external expansion chassis, all Rhino*JR* removable drive enclosures, and all RAID controller modules. In addition, the following components of the Data Express, Data Silo, Data Stacker, InfoStation products are subject to warranty for a period of three (3) years: all power supplies, fans and blowers.

Warranty Claim Requirements

To obtain warranty service, the defective product must be returned to your local authorized StorCase dealer or distributor, or, with prior StorCase approval, to the StorCase factory service center.

For defective products returned directly to StorCase, a Return Material Authorization ("RMA") number must be obtained by calling StorCase Customer Service at (714) 445-3455. The RMA number must be prominently displayed on the outside of the return package. Shipments must be freight-prepaid and insured, and must include the product serial number, a detailed description of the problem experienced, and proof of the original retail purchase date. Products must be properly packaged to prevent damage in transit. Damage resulting from improper packaging will not be covered by this warranty. The StorCase factory service center is located at 17650 Newhope Street, Receiving Dock, Gate #4, Fountain Valley, CA 92780, U.S.A.

Free Technical Support

StorCase provides free technical support. If you experience any difficulty during the installation or subsequent use of a StorCase product, please contact StorCase's Technical Support Department prior to servicing your system. This warranty covers only repair or replacement of defective StorCase products, as described above. StorCase is not liable for, and does not cover under warranty, any costs associated with servicing and/or installation of StorCase products.

StorCase Technical Support can be reached in the U.S. at (714) 438-1858 or toll-free at (888) 435-5460 (U.S. and Canada only). StorCase European Technical Support can be reached in the U.K. at +44 (0) 1932 738900.

Disclaimers

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StorCase TECHNOLOGY
A Kingston Technology Company

Declaration of Conformity

Company Name:	StorCase Technology, Inc.
Corporate Office Address:	17600 Newhope Street Fountain Valley, CA 92708
Manufacturing Address:	17600 Newhope Street Fountain Valley, CA 92708
Product Name:	Data Silo DS560 & DS570
Model Number:	S30G10X

Conforms to the following standards:

EMC Directives: **(89/336/EEC)**	EN 50081-1: 1992 Generic Emission - EN 55022/CISPR22 Class A - EN 61000-3-2 Harmonic Current - EN 61000-3-3 Voltage Fluctuations and Flicker EN 55024: 1998 ITE Immunity - IEC 61000-4-2 - IEC 61000-4-3 - IEC 61000-4-4 - IEC 61000-4-5 - IEC 61000-4-6 - IEC 61000-4-8 - IEC 61000-4-11
Low Voltage Directive: **(73/23/EEC)**	EN 60950
Safety Standards: **CSA (NRTL/C)**	CAN/CSA-C22.2 No. 60950 UL 60950, Third Edition
TUV:	EN 60950: 2000
EMI Standards:	FCC Part 15, Class A
EMC Standards:	AS/NZS 3548 Information Technology Equipment
Year of Manufacture:	2002

Signature:_____
Full name: Dieter Paul
Position: President

Federal Communications Commission (FCC) Statement

RADIO FREQUENCY INTERFERENCE STATEMENT

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate that equipment.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Important Safety Instructions

1. Read all these instructions.
2. Save these instructions for later use.
3. Follow all warnings and instructions marked on the product.
4. Do not use this product near water.
5. This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
6. Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage points or other risk. Refer all servicing to service personnel.

Wichtige Sicherheitshinweise

1. Diese Hinweise sollten vollständig durchgelesen werden.
2. Diese Hinweise für einen späteren Gebrauch aufbewahren.
3. Allen auf dem Gerät angebrachten Warnungen und Hinweisen folgen.
4. Das Gerät nicht in der Nähe von Wasser verwenden.
5. Das Gerät nur mit dem Aufkleber bezeichneten Netzspannung betreiben. Bei Fragen über die Art der Netzspannung sollte der Händler oder das Energieversorgungsunternehmen zu rate gezogen werden.
6. Nicht versuchen das Produkt selbst zu reparieren. In allen Produkten existieren gefährliche elektrische Spannugen. Nicht das Gehäuse öffnen.
7. Wartungsarbeiten nur von qualifiziertern Kundendienstpersonal ausführen laßen.

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NOTICE: This User's Guide is subject to periodic updates without notice. While reasonable efforts have been made to ensure the accuracy of this document, Storcase Technology, Inc. assumes no liability resulting from errors or omissions in this publication, or from the use of the information contained herein.

Please check StorCase's web site at http://www.storcase.com or contact your StorCase representative for the latest revision of this document.

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INTRODUCTION

Packaging Information

The StorCase Technology SCSI-to-IDE RAID enclosure is shipped in a container designed to provide protection and prevent damage during shipment. The unit was carefully inspected before and during the packing procedure at the factory. Evidence of any damage to the unit should be reported to the shipper immediately.

If the wrong model has been received, please call your reseller or StorCase at (800) 435-0642 to arrange for a Return Material Authorization (RMA). StorCase cannot accept returns which do not display an RMA number on the outside of the package. Return the unit with all the original packing materials.

Before removing any component from its packaging, discharge any static electricity by touching a properly grounded metal object.

Serial Number

The unit is labeled with a serial number. This number must be reported to the StorCase Customer Service Representative in order to receive a Return Material Authorization (RMA) for warranty claims. Locate the serial number label and record the number in the space provided below.

Serial Number:

General Description

CAUTION: The DS560/DS570 chassis contains NO USER SERVICEABLE parts inside the unit. Refer ALL servicing to qualified personnel!

NOTES: The configuration and use of the SCSI-to-IDE RAID Controller requires a certain level of expertise and experience on the part of the user/integrator. Since there are many configuration options and variables (ie. host platforms, applications, etc.), only general guidelines will be discussed in this User's Guide.

Refer to the *Data Silo DS550 User's Guide*, *Data Express DE90i-A100 or DE110 User's Guide* for additional operating and installation information. Also refer to the disk manufacturer's documentation for specific information regarding the disks.

The StorCase Technology Data Silo DS560 and DS570 SCSI-to-IDE RAID enclosures (Figure 1) are a cost-effective, high performance RAID solution, incorporating the Data Silo expansion chassis and Data Express removable drive enclosures. The DS560 provides rugged and reliable housing for one (1) SCSI-to-IDE RAID controller and eight (8) DE90i-A100s, while the DS570 provides rugged and reliable housing for one (1) SCSI-to-IDE RAID controller and eight (8) DE110s.

Product Features:

- Supports RAID levels 0, 1, 0+1, 3, and 5
- O/S independent (no special software drivers required)
- Supports dual Ultra160 SCSI channels
- Supports up to eight (8) Ultra ATA/100 IDE drives
- Online Capacity Expansion (OCE) allows adding drives without interruptions
- 128MB of PC-100 or PC-133 Compatible SDRAM 144-pin SODIMM memory module
- Supports Automatic Hot Swap, Hot Spare and Drive Rebuild
- Supports up to 8 LUNs
- Supports Page/FAX notification event
- Supports daisy-chaining with optional repeater kit

This User's Guide describes the basic steps required to use the StorCase Data Silo SCSI-to-IDE RAID enclosure. This guide supplements documentation provided with the Data Silo DS550, Data Express DE90i-A100, and Data Express DE110.

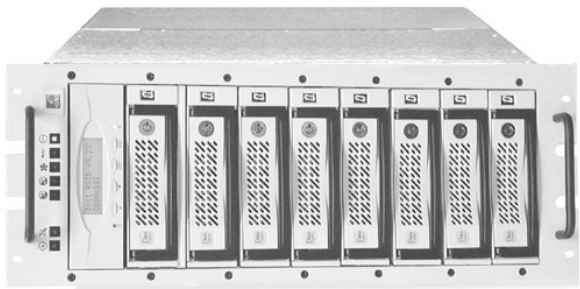


Figure 1: Data Silo SCSI-to-IDE Enclosure (DS570 Shown)

Chassis Front Panel

(Figures 2A & 2B)

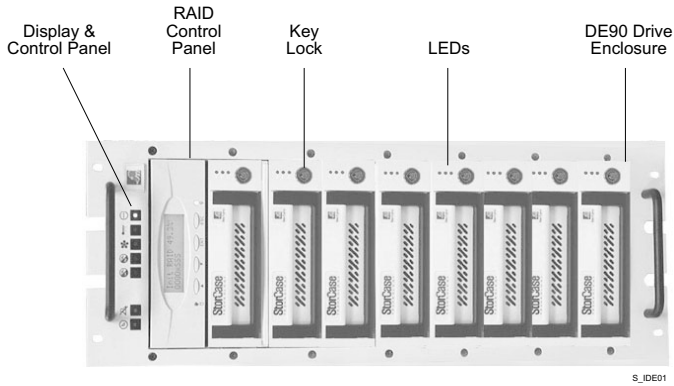


Figure 2A: Data Silo DS560
(Front)

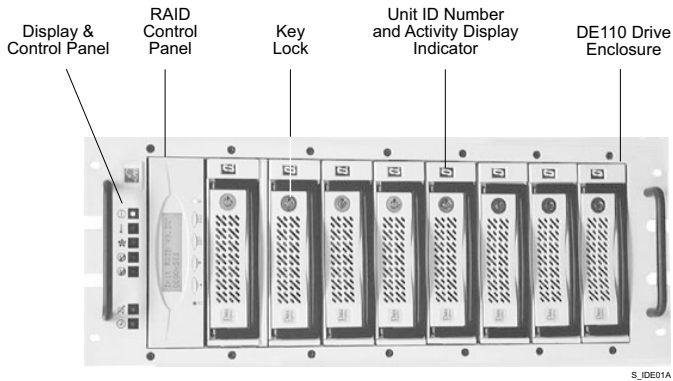


Figure 2B: Data Silo DS570
(Front)

- **RAID Control Panel** - Refer to Figure 5.

- **Key Lock/Drive Power Switch** - Performs three (3) functions. The key lock assures proper seating of the device carrier within the receiving frame, turns power to the device ON and OFF, and prevents unauthorized removal or installation of the carrier. For the computer to access data on the drive, the key lock must be turned counterclockwise to the locked position.

- **Display and Control Panel** (Figure 3) - The display contains seven (7) lights which provide the following information:

  Power ON - Steady glow indicates that power is being supplied to the Data Silo chassis.

  Temp Warning - Flashing red indicates that internal operating temperature has reached 43° C (109° F). Audible alarm (buzzer) will also sound.

  NOTE: Warning message will also display on the RAID Controller LCD Screen (or remote terminal if Monitor Utility is used). Refer to Appendix C for further information.

  Blower 1 or 2 Failure - Flashing red indicates a blower has failed. Audible alarm (buzzer) will also sound.

  NOTE: Warning message will also display on the RAID Controller LCD Screen (or remote terminal if Monitor Utility is used). Refer to Appendix C for further information.

  Power Supply 1 Failure - Flashing red indicates first power supply has failed. Audible alarm (buzzer) will also sound.

  Power Supply 2 Failure - Flashing red indicates second power supply has failed. Audible alarm (buzzer) will also sound.

  Mute - When switch is depressed, a steady yellow glow indicates the alarm buzzer has been disabled. Depress again to enable buzzer.

  Reset - Depress switch to reset chassis and clear any error conditions.

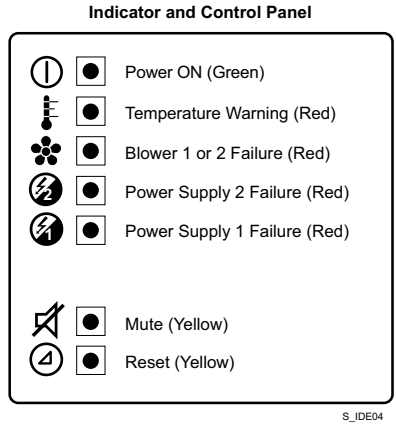


Figure 3: Indicator and Control Panel

(Applies to DS560 model only)

- **Front Panel Indicator LEDs** (Figure 3A) - Indicator LEDs on the DE90i-A100 receiving frame front panel provide important operating information based on the conditions listed in Table 1.

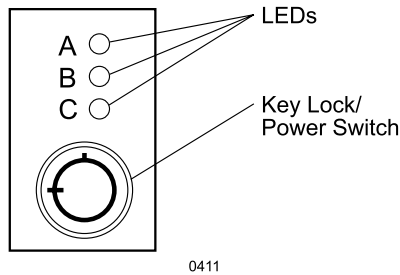


Figure 4A: DE90 Receiving Frame Front Panel

Table 1: DE90 Receiving Frame Front Panel Indicator Conditions

CONDITION	LED A	LED B	LED C
Carrier removed from receiving frame, power on	ON	OFF	OFF
Carrier in receiving frame, unlocked position	ON	BLINK	OFF
Carrier in receiving frame, locked position	ON(1)	ON(1)	OFF
Drive activity active	BLINK	ON	OFF
Invalid Master/Slave jumper configuration on J5	BLINK	BLINK	BLINK

(1) Indicators A and B will alternately blink during the 10 second drive spin down/up period after the key has been turned on or off. When the carrier has been unlocked from the receiving frame, these lights will flash as the drive spins down. DO NOT REMOVE THE CARRIER FROM THE RECEIVING FRAME DURING THIS PERIOD to prevent possible drive damage.

(Applies to DS570 model only)

- **Unit ID Number and Activity Display Indicator(s)** -Display the physical address of the DE110 device carrier if the carrier is *Installed and Locked* into the receiving frame *or* if the carrier is removed from the receiving frame. If the carrier is *Installed but not Locked* in the receiving frame, a "u" will be displayed to indicate an unlocked condition. The unit ID number is factory-set to "0" on both DE110 receiving frames.

  A small dot next to the unit ID number illuminates to indicate when the host computer is accessing the data on the DE110 carrier. This dot will flash during communication with the host computer (Figure 4B).

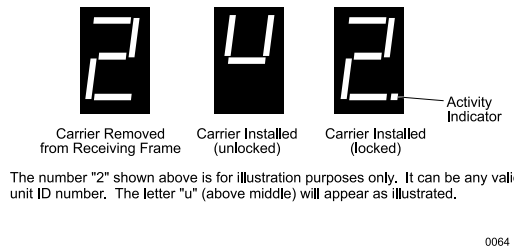

Activity Indicator
Carrier Removed from Receiving Frame
Carrier Installed (unlocked)
Carrier Installed (locked)
The number "2" shown above is for illustration purposes only. It can be any valid unit ID number. The letter "u" (above middle) will appear as illustrated.
0064

Figure 4B: DE110 Receiving Frame Unit ID Number and Activity Display

SCSI-to-IDE RAID Control Panel

(Figure 5)

- **Activity LED** - Indicates that data is being accessed.
- **Scroll UP/DOWN Buttons** - Used to navigate through the RAID Controller menu.
- **Enter Button** - Used to select a menu option, open a sub-menu, or select a value.
- **Escape Button** - Used to exit a sub-menu and return to the previous menu.
- **Power LED** - Steady glow indicates normal power operation. No glow indicates no A/C power.
- **LCD Display** - Displays menu options and messages for configuration.

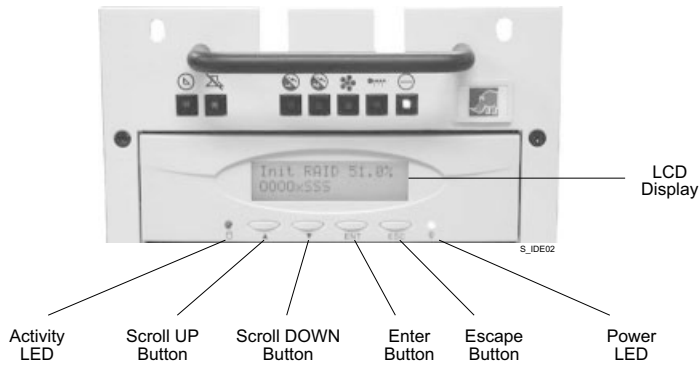


Figure 5: RAID Control Panel

Chassis Rear Panel

(Figures 6 & 7)

NOTE: If a module slot is to be left empty, the filler plate (provided) must be installed. Installation of the filler panel is necessary for proper cooling inside chassis.

- **SCSI I/O Connectors** - The DS570 comes equipped with two (2) Ultra160 68-pin HD connectors.

  Host Ch. 1 - Connects to SCSI Host 1.

  Host Ch. 2 - Connects to SCSI Host 2.

- **DB9 Connectors** - The DS570 comes equipped with two (2) DB9 serial connectors.

  (RS-232) - Connects to a VT-100/ANSI terminal via a DB9-DB9 cable (provided). Refer to section "*Monitor Utility*" for further information.

  (MODEM) - Connects to a modem for Page/FAX notification. Refer to section "*System Params Menu*" for further information.

- **Power Supply Module(s)** - Dual 400W auto-ranging power supply modules run in Shared Mode which allows both to operate at reduced wattage and lower operating temperature. In the event that one power supply should fail, the other will carry the full load.

  Blower Vent(s) - Two (2) adjustable dual-speed blowers (one in each power supply module) provide ample cooling of chassis (79 CFM Total).

  Module Handle(s) - Provide a sturdy grip for the installation and removal of the power supply modules.

  WARNING: DO NOT USE MODULE HANDLES TO LIFT CHASSIS! These handles are specifically designed for the installation and removal of modules only!

  Power Switch(es) - Rocker switch(es) control power to the power supply module(s).

  A/C Power In - Accepts U.S. and other available international standard power cords.

Blower Speed Selector Switch(es) - Allow user to manually select between two speeds (Low & High) for each blower. HIGH speed (factory default) is recommended for high performance (10K RPM and higher) drives.

NOTE: In the event a blower fails, always set the speed of the remaining blower to HIGH.

Status LED(s) -

Green = Steady glow indicates normal power supply/blower operation.

OFF = No glow indicates a fault in either the power supply or blower (or both). Refer to the Indicator and Control Panel LEDs on the front of the DS570 for further information.

- **Factory-Reserved** - Allows the installation of future StorCase upgrade products.
- **Logic Card** - Allows easy access to the DS570 hot-pluggable daughterboard (refer to the *Data Silo DS550 User's Guide* for further information).

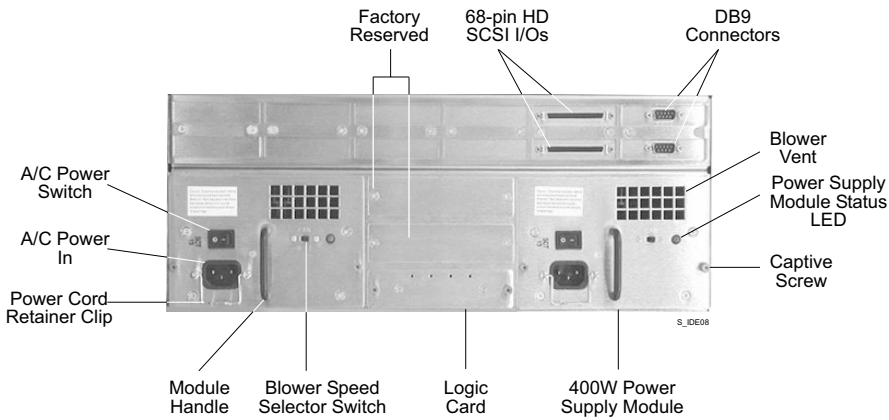


Figure 6: Rear Panel

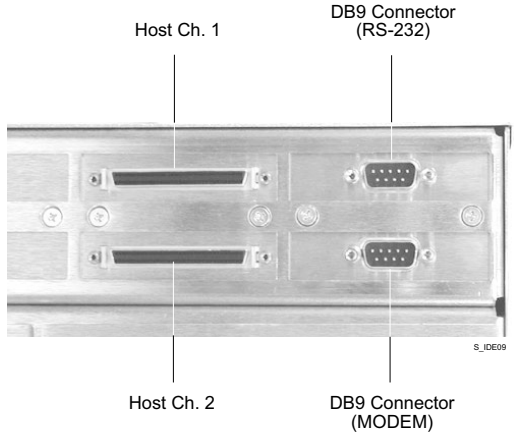


Figure 7: Enlarged View of I/O Panel

INSTALLATION

CAUTION: The DS560/DS570 chassis contains NO USER SERVICEABLE parts inside the unit. Refer ALL servicing to qualified personnel!

NOTE: Refer to the *Data Silo DS550 User's Guide*, *Data Express DE90i-A100 or DE110 User's Guide* for additional operating and installation information. Also refer to the disk manufacturer's documentation for specific information regarding the disks.

Drive Preparation

1. Remove the drive from its protective packaging.

2. **Plastic Drive Bezel:** If the drive came equipped with a plastic front bezel, it must be removed before installing the drive into the drive carrier.

3. **Master/Slave Drive Selection:**

   DS560 only - In most cases, your drive will be factory-configured as a Master Ultra ATA/100 drive using a jumper plug on the drive itself. No configuration changes are required.

   DS570 only - In most cases, your drive will be factory-configured as a Master Drive using a jumper option on the drive itself. StorCase however, recommends reconfiguring the drive to **Cable Select** instead. This can be done by configuring the jumper option on the drive itself (refer to the drive manufacturer's documentation for further information).

NOTE: Since specifications (specifically, pin assignments) between drive manufacturers may vary, please refer to your drive manufacturer's documentation for exact information regarding Cable Select configuration.

Drive Installation (for DS560 model only)

1. Attach the I/O cable from the drive carrier circuit board of the DE90i-A100 to the drive (Figure 8).

2. Attach the 4-pin DC power cable from the rear distribution board to the drive (Figure 8). Carefully insert the drive into the drive carrier at an angle, cable-end first. Make sure none of the cables are pinched. Lower the front of the drive carefully into place. Fasten the drive into the carrier with the four (4) screws provided as shown in Figure 8.

3. Install the cable cover (provided) by snapping into place.

   Proceed to Step 4 oon page 15.

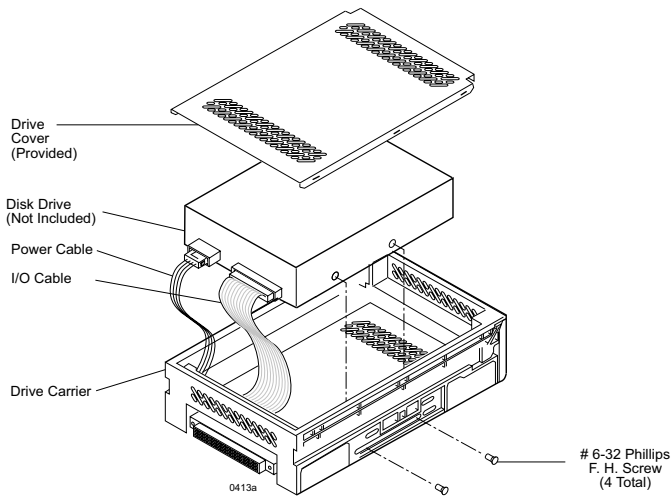


Figure 8: Drive Installation Assembly (DS560 only)

Drive Installation (for DS570 model only)

1. Attach the DC power cable (from the Drive Carrier Board) to the drive (Figure 9).

2. Carefully insert the drive into the carrier. Slide the drive towards the Drive Carrier Board, so that the I/O connector on the drive mates with the connector on the Drive Carrier Board (Figure 9). **Make sure that the DC power cable is not pinched.**

3. Fasten the drive into place with four (4) #6-32 Phillips Flat Hd. screws (Figure 9). Install the provided drive cover (Figure 9).

Proceed to Step 4 on page 15.

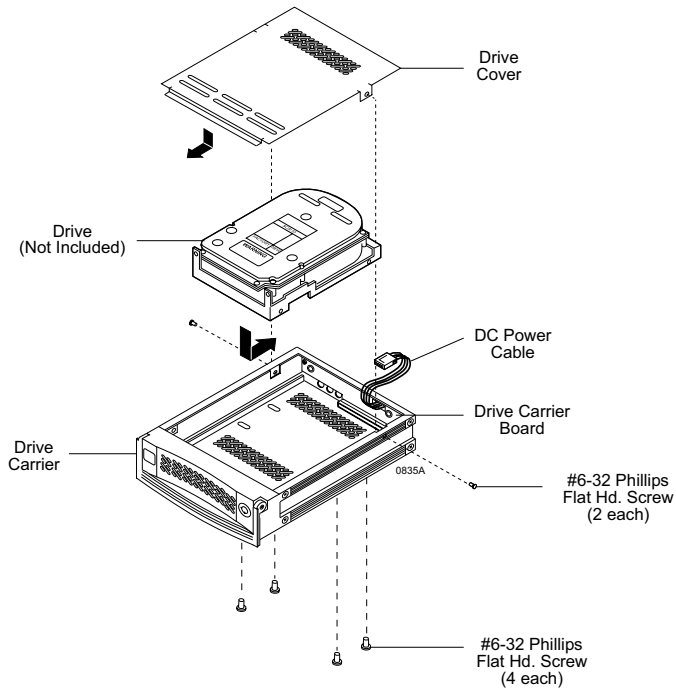


Figure 9: Drive Installation Assembly (DS570 only)

4. The drive carrier is now ready to be inserted into the receiving frame.

   NOTE: The lock on the Data Express receiving frame functions as a lock and a DC power switch for the carrier unit. The lock must be engaged in order to supply power to the carrier and installed drive.

5. Reboot the computer. The new disks is now ready for use, although it may have to be formatted or initialized prior to use with your operating system and applications software.

   WARNING: Unlocking the carrier unit switches DC power off to the drive. Since disk drives require a short amount of time to spin down, allow about 15 seconds before pulling the carrier unit out of the receiving frame to avoid possible damage to the drive.

Typical Dual Channel RAID Configuration

NOTES: The installation, configuration, and use of the SCSI-IDE RAID Controller requires a certain level of expertise and experience on the part of the user/integrator. Since there are many configuration options and variables (ie. host platforms, applications, etc.), only general guidelines will be discussed in this User's Guide.

Refer to the *Data Silo DS550 User's Guide*, *Data Express DE90i-A100 or DE110 User's Guide* for additional operating and installation information. Also refer to the disk manufacturer's documentation for specific information regarding the disks.

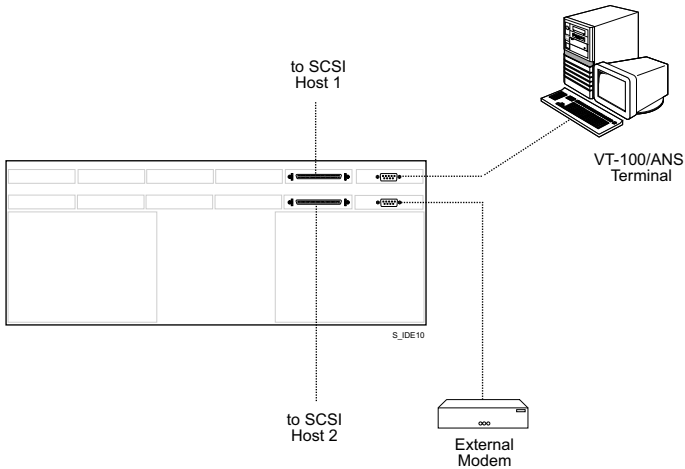


Figure 10: Typical Dual Channel RAID Configuration

Optional Repeater Configurations

Optional Repeaters are available to daisy-chain additional Data Silo chassis together (Figures 11 & 12). Contact StorCase for further ordering information.

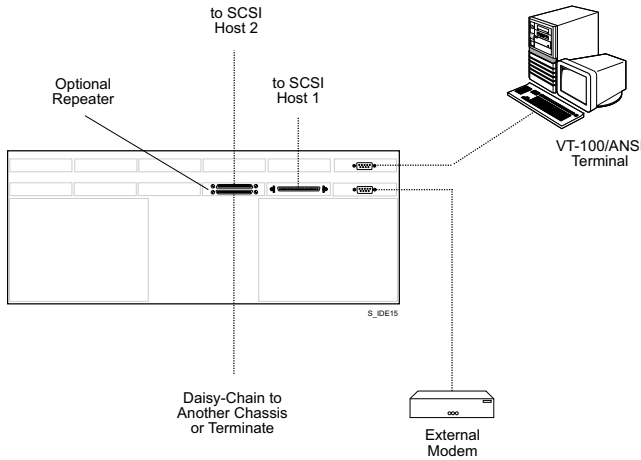


Figure 11: Typical Dual Channel RAID Configuration with One Optional Repeater Installed

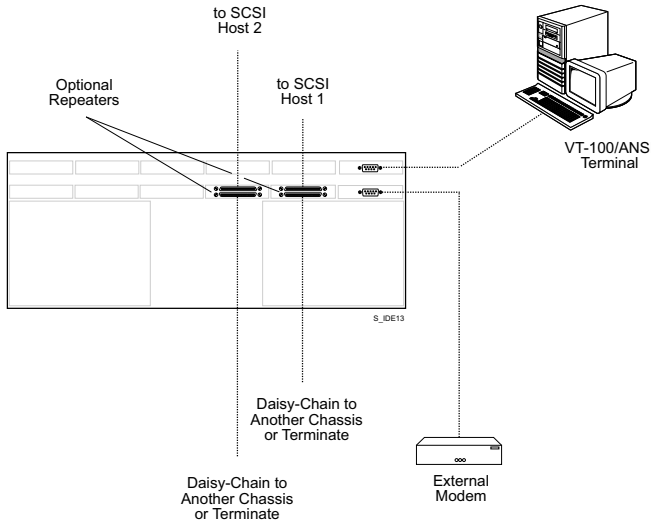


Figure 12: Typical Dual Channel RAID Configuration with Two Optional Repeaters Installed

CONFIGURATION

NOTES: The installation, configuration, and use of the SCSI-to-IDE RAID Controller requires a certain level of expertise and experience on the part of the user/integrator. Since there are many configuration options and variables (ie. host platforms, applications, etc.), only general guidelines will be discussed in this User's Guide.

Refer to the *Data Silo DS550 User's Guide*, *Data Express DE90i-A100 or DE110 User's Guide* for additional operating and installation information. Also refer to the disk manufacturer's documentation for specific information regarding the disks.

Configuration Overview

The SCSI-to-IDE RAID control panel (Figure 13) allows for exploration of all configuration options. However, the LCD screen can only display limited amounts of information at a time.

To display all information on a larger terminal screen, the RAID Controller can be accessed via a computer serial port (female DB9-female DB9 cable provided). Refer to section "*Monitor Utility*" for further information.

NOTE: The Monitor Utility and the front control panel cannot be used at the same time. When one is active, the other is disabled.

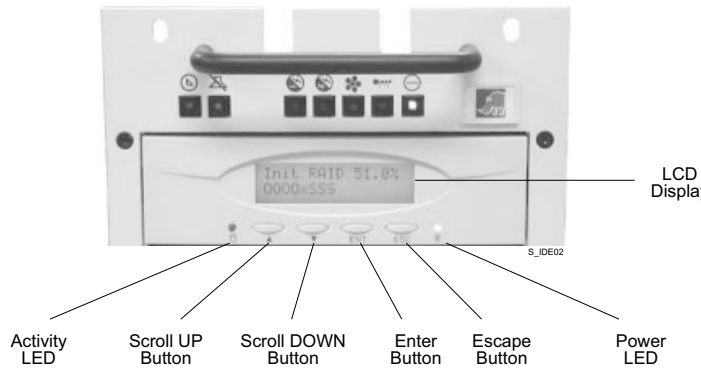


Figure 13: LCD Display and Control Panel

LEDs

Activity Indicates data is being accessed
Power Indicates power is ON

Control Panel Buttons

↑ Use to scroll UP through the menu items
↓ Use to scroll DOWN through the menu items
ENT Use to select a menu item, open a sub-menu, or to select a a value
ESC Use to exit a sub-menu and return to the previous menu

Table 2: LCD Display Components

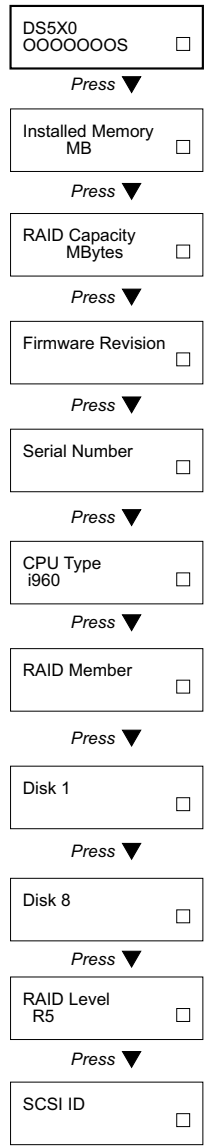
Field	Description	
DS5X0	Model number.	
OOOOOOOS	Disk status. The farthest O to the left is Disk 1. Press ▼ button to view the next page.	
	Symbol	**Description**
	X	Disk is not installed.
	A	Disk is being added.
	O	Disk is Online.
	S	Disk is a spare disk.
	R	Disk is removed.
	I	Disk is being checked.
Rx	RAID level (x = 0, 0+1, 1, 3, or 5) configuration.	
ID:x	SCSI ID configuration (x=0-15).	
□	Alternating cursor indicating operational status.	

When the ***Enter*** button is pressed in Operation Mode, the RAID Controller will go into Configuration Mode.

NOTE: Configuration Mode will automatically cancel after 3 minutes (180 seconds) of User inactivity.

Operation Mode

The front panel LCD continuously displays the current status of the RAID Controller. A typical display will look like the following:



Mode Operation

The SCSI-to-IDE RAID Controller operates in three (3) modes:

- Self-Diagnostic Mode
- Configuration Mode
- Operation Mode

Self-Diagnostic Mode

To ensure flawless operation, the RAID Controller has a built-in self-diagnostic utility. Self-Diagnostic Mode occurs automatically upon power up, or after the RAID Controller has been reset. During this mode, all components are tested and any potential problems are reported.

The Self-Diagnostic Mode runs three major diagnostic tests. The first diagnostic includes testing the CPU and supporting core logic chips, the internal bus, memory, SCSI controller, and EIDE controllers. The second diagnostic tests for the presence of disks on each individual disk channel. It also checks the functionality of each disk found. The final diagnostic tests the RAID functionality.

Configuration Mode

NOTE: The RAID Controller should be OFFLINE (disconnected from the host system) when Configuration Mode is running.

Configuration Mode may be selected whenever the ***Enter*** button is pressed during Operation Mode or when the Monitor Utility is invoked from the remote terminal. In Configuration Mode, the user is able to modify the settings of the RAID Controller and perform different functions to the controller.

Entering a Password

If the password-check feature is enabled, the user will be prompted to enter a password before proceeding (the default password is "00000000"). Refer to section "*System Params Menu*" for information on how to change the default password.

The user may use the front control panel buttons to enter the password. Use the ↓ and ↑ keys to scroll through the available characters, then use the ***Enter*** button to select the character and move to the next position. Once all the characters have been entered, press the ***Enter*** button to access the Configuration Mode.

The Main Menu consists of six (6) categories, as shown in Table 3.

Table 3: Main Menu Options

Main Menu
0 Quick Setup
1 RAID Params
2 SCSI Params
3 RS232 Params
4 System Params
5 NVRAM
6 RAID Func

Configuring the RAID Controller

The following information describes how to configure the RAID Controller for operation. To configure the RAID Controller, the user must first configure the RAID settings and the SCSI settings. After these two steps are completed, the RAID Controller will be seen as a normal SCSI disk to the host system.

Initial RAID Configuration

This section provides instructions on how to set-up a RAID configuration for the first time. These steps may also be performed by the Monitor Utility. Refer to section "*Monitor Utility*" for information on configuring and using this feature.

Quick Set-Up

1. Make sure the RAID Controller is ON.
2. Press ***Enter*** to display the Main Menu.
3. Press ***Enter*** to open the **0 Quick Set-Up** menu.
4. Press ↓ until the **01 Quick Set-Up** menu is displayed, then press ***Enter***.
5. Press ↓ until the **011 Reconfirm** menu is displayed, then press ***Enter***.
6. Select YES to change the existing RAID configuration.

Single Host Configuration

1. Make sure the RAID Controller is ON.
2. Press ***Enter*** to display the Main Menu.
3. Press ***Enter*** to open the **1 RAID Params** menu.
4. Press ↓ until the **11 Re-Conf RAID** menu is displayed, then press ***Enter***.
5. Press ↓ until the **12 RAID Level** menu is displayed, then press ***Enter***.
6. Select the listing "0, 1, 5" to configure for RAID Level, then press ***Enter***.
7. Press ↓ until the **13 Disk Number** menu is displayed, then press ***Enter***.
8. Use the ↓ button to select the number of disks to configure for the RAID Controller, then press ***Enter***.

   NOTE: Disk number does not include "Hot Spare" disk.

9. Press **Esc** to return to the Main Menu.
10. Press ↓ until the **2 SCSI Params** menu is displayed, then press ***Enter***.
11. Press ↓ until the **21 Set SCSI ID** menu is displayed, then press ***Enter***.
12. Use the ↓ button to select a SCSI ID for the RAID Controller, then press ***Enter***.

    NOTE: Default is SCSI ID 0.

13. Press ↓ until the **22 Termination** menu is displayed, then press ***Enter***.

14. Use the ↓ button to enable /disable the SCSI termination for the RAID Controller, then press ***Enter***.

    NOTE: If the RAID Controller is at the end of the SCSI bus, termination should be enabled. If the RAID Controller is in the middle of a SCSI bus, termination should be disabled.

15. Press ↓ until the **23 Tag Queuing** menu is displayed, then press ***Enter***.
16. Use the ↓ button to enable /disable the Tag Queuing for the RAID Controller, then press ***Enter***.

    NOTE: The default setting for Tag Queuing is enabled. Tag Queuing allows the RAID Controller to process multiple requests, which improve performance.

17. Press ↓ until the **224 Ultra** and **225 Wide** menus are displayed, then press ***Enter***.
18. Refer to Table 4 to set-up the SCSI interface of the Host.

Table 4: SCSI Set-Up

SCSI Interface	Wide	Fast	Ultra	Ultra2	Ultra3
SCSI-2	Disable	[ENT]			
Wide SCSI	Enable	[ENT]			
Ultra SCSI	Disable		[ENT]		
Ultra Wide SCSI	Enable		[ENT]		
Ultra2 SCSI	Enable			[ENT]	
Ultra160 SCSI	Enable				[ENT]

19. Press **Esc** to return to the Main Menu.
20. Press ↓ until the **5 NVRAM** menu is displayed, then press ***Enter***.
21. Press ↓ until the **51 Update NVRAM** menu is displayed, then press ***Enter***.
22. Press ↓ until the YES option is displayed, then press ***Enter***.
23. Press ↓ until the **53 Restart** menu is displayed, then press ***Enter***.
24. Press ↓ until the YES option is displayed, then press ***Enter***.

    NOTE: This will automatically restart the RAID Controller.

Single Host Configuration for Logical Units

A RAID array may be divided into multiple logical units. A logical unit is that portion of a disk array seen by the host system as a single logical device. Each logical unit is identified to the host by its Logical Unit Number (LUN). The RAID Controller can support up to eight (8) logical units.

1. Make sure Single Host Configuration is completed first.
2. Press ***Enter*** to open the **6 RAID Funcs** menu.
3. Press ↓ until the **62 Init R5/R3** menu is displayed, then press ***Enter***.
4. Press ↓ until the STOP option is displayed, then press ***Enter***.
5. Press **Esc** to return to the Main Menu.
6. Press ***Enter*** to open the **1 RAID Params** menu.
7. Press ↓ until the **14 Slice** menu is displayed, then press ***Enter***.

   NOTE: Slice will allow you to divide the partition size.

8. Press ↓ until the **141 Slice 0(MB)** menu is displayed, then press ***Enter***.

9. Key in the desired capacity in Slice 0, then press ***Enter***.
10. Press ↓ to select the **142 Slice 1(MB)** to **148 Slice 7(MB)**, repeat Steps 8-9.
11. Press **Esc** to return to the Main Menu.
12. Press ↓ until the **2 SCSI Params** menu is displayed, then press ***Enter***.
13. Press ↓ until the **216 LUN Map** menu is displayed, then press ***Enter***.
14. Press ↓ until the **2161 LUN 0** menu is displayed, then press ***Enter***.
15. Refer to Table 5 to set-up LUN menu.

Table 5: LUN Set-Up

LUN 0	Slice 0
LUN 1	Slice 1
LUN 2	Slice 2
LUN 3	Slice 3
LUN 4	Slice 4
LUN 5	Slice 5
LUN 6	Slice 6
LUN 7	Slice 7

16. Press **Esc** to return to the Main Menu.
17. Press ↓ until the "5 NVRAM" menu is displayed, then press ***Enter***.
18. Press ↓ until the "51 Update NVRAM" menu is displayed, then press ***Enter***.
19. Press ↓ until the YES option is displayed, then press ***Enter***.
20. Press ↓ until the "53 Restart" menu is displayed, then press ***Enter***.

21. Press ↓ until the YES option is displayed, then press ***Enter***.
22. Press ***Enter*** to open the **6 RAID Funcs** menu.
23. Press ↓ until the **62 Init R5 /R3** menu is displayed, then press ***Enter***.
24. Press ↓ until the START option is displayed, then press ***Enter***.

NOTE: The RAID Controller is now configured for logical units.

Dual Host Configuration

1. Make sure the RAID Controller is ON.
2. Press ***Enter*** to display the Main Menu.
3. Press ***Enter*** to open the **1 RAID Params** menu.
4. Press ↓ until the **11 Re-Conf RAID** menu is displayed, then press ***Enter***.
5. Press ↓ until the **12 RAID Level** menu is displayed, then press ***Enter***.
6. Select the listing "0, 1, 3, 0+1, 5" to configure the RAID level, then press ***Enter***.
7. Press ↓ until the **13 Disk Number** menu is displayed, then press ***Enter***.
8. Use the ↓ button to select the number of disks to configure for the RAID Controller, then press ***Enter***.

NOTE: Disk number does not include "Hot Spare" disk.

9. Press **Esc** to return to the Main Menu.
10. Press ↓ until the **21 Primary SCSI** menu is displayed, then press ***Enter***.
11. Press ↓ until the **211 Set SCSI ID** menu is displayed, then press ***Enter***.
12. Use the ↓ button to select a SCSI ID for the RAID Controller, then press ***Enter***.

NOTE: Default is SCSI ID 0.

13. Press ↓ until the **212 Termination** menu is displayed, then press ***Enter***.
14. Use the ↓ button to enable/disable SCSI termination for the RAID Controller, then press ***Enter***.

NOTE: If the RAID Controller is at the end of the SCSI bus, termination should be enabled. If the RAID Controller is in the middle of a SCSI bus, termination should be disabled.

15. Press ↓ until the **213 Tag Queuing** menu is displayed, then press ***Enter***.
16. Use the ↓ button to enable/disable Tag Queuing for the RAID Controller, then press ***Enter***.

NOTE: The default setting for Tag Queuing is enabled. Tag Queuing allows the RAID Controller to process multiple requests, which improve performance.

17. Press ↓ until the **214 Ultra** and **215 Wide** menus are displayed, then press ***Enter***.
18. Refer to Table 4 to set-up the SCSI interface of the Host.

19. Press **Esc** and ↓ until the **22 Secondary Host** menu is displayed, then press **Enter**.
20. Repeat Steps 11-18 to select the Secondary Host.
21. Press ↓ until the **5 NVRAM** menu is displayed, then press ***Enter***.
22. Press ↓ until the **51 Update NVRAM** menu is displayed, then press ***Enter***.
23. Press ↓ until the YES option is displayed, then press ***Enter***.
24. Press ↓ until the **53 Restart** menu is displayed, then press ***Enter***.
25. Press ↓ until the YES option is displayed, then press ***Enter***.

NOTE: This will automatically restart the RAID Controller.

26. Press ***Enter*** to open the **6 RAID Funcs** menu.
27. Press ↓ until the **62 Init R5 /R3** menu is displayed, then press ***Enter***.
28. Press ↓ until the STOP option is displayed, then press ***Enter***.
29. Press **Esc** to return to the Main Menu.
30. Press ***Enter*** to open the **1 RAID Params** menu.
31. Press ↓ until the **14 Slice** menu is displayed, then press ***Enter***.

NOTE: Slice will allow you to divide the partition size of RAID Controller.

32. Press ↓ until the **141 Slice 0(MB)** menu is displayed, then press ***Enter***.
33. Key in the desired capacity in Slice 0, then press ***Enter***.
34. Press ↓ to select the **142 Slice 1(MB)** to **148 Slice 7(MB)**, repeat Steps 8-9.
35. Press **Esc** to return to the Main Menu.
36. Press ↓ until the **21 Primary SCSI** menu is displayed, then press ***Enter***.
37. Press ↓ until the **216 LUN Map** menu is displayed, then press ***Enter***.
38. Press ↓ until the **2161 LUN 0** menu is displayed, then press ***Enter***.
39. Refer to Table 5 to set-up LUN menu.
40. Press **Esc** and ↓ until the **22 Secondary Host** menu is displayed, then press **Enter**.
41. Repeat Steps 36-39 to select the Secondary Host.
42. Press **Esc** to return to the Main Menu.
43. Press ↓ until the **5 NVRAM** menu is displayed, then press ***Enter***.
44. Press ↓ until the **51 Update NVRAM** menu is displayed, then press ***Enter***.
45. Press ↓ until the YES option is displayed, then press ***Enter***.
46. Press ↓ until the **53 Restart** menu is displayed, then press ***Enter***.

NOTE: This will automatically restart the RAID Controller.

47. Press ↓ until the YES option is displayed, then press ***Enter***.
48. Press ↓ until the **6 RAID Funcs** menu is displayed, then press ***Enter***.
49. Press ↓ until the **62 Init R5/R3** menu is displayed, then press ***Enter***.
50. Press ↓ until the START option is displayed, then press ***Enter***.

NOTE: The RAID Controller is now configured for Dual Host.

Array Management

The unique RAID Controller array management firmware utilizes multi-tasking real-time kernel technology to manage the controller. Additional features are real-time load analysis, online diagnostics, event logging and broadcasting, and device inventory management.

RAID Levels

The RAID Controller supports RAID levels 0, 0+1, 1, 3, and 5. Depending on the application that will be used, each RAID level offers a difference in performance, functionality, and fault tolerance as shown in Table 6.

Table 6: RAID Level Comparisons

RAID Level	Minimum # of Drives	Description	Pros	Cons
RAID 0	2	Data striping without redundancy	Highest performance	No data protection - if one drive fails, all data is lost
RAID 1	2	Disk mirroring	Very high performance and data protection Good write performance	High redundancy costs - twice the storage capacity is required
RAID 3	3	Block-level data striping with dedicated parity drive	Excellent performance for large, sequential data requests	Poorly suited for transaction-oriented network applications Single parity drives do not support multiple, simultaneous read/write requests
RAID 5	3	Block-level data striping with distributed parity	Best cost and performance for transaction-oriented networks Very high performance and data protection Supports multiple simultaneous read/writes Can also be optimized for large, sequential requests	Write performance is slower than RAID 0 or RAID 1
RAID 10 RAID 0/1	3	Combination of RAID 0 (data striping) and RAID 1 (mirroring)	Highest performance and data protection (can tolerate multiple drive failures)	High redundancy costs - twice the storage is capacity required

RAID Params Menu

The RAID Params menu configures the RAID Controller for the different supported RAID levels.

NOTE: Any changes made to **11 Re-Conf RAID**, **12 RAID Level**, **13 Disk Number**, **14 Slice** or **15 Stripe** will permanently erase any data on disks!

Sub-Menu	Settings/Options	Default
11 Re-Conf RAID	NO/YES	No
Use to change an existing RAID configuration.		
12 RAID Level	0, 1, 0+1, 3, 5, None	5
Use to specify RAID Level.		
13 Disk Number	8, 6, 4, 2	8
Use to specify number of physical disks in the array.		
14 Slice	141 Slice 0 - 148 Slice 7	(MB)
Use to divide partition size.		
15 Stripe Size	128, 64, 32, 16, 8	128
Use to specify the size (in blocks, 1 block=512bytes) of the data stripe written to the disks.		
16 Write Buffer	Enable/Disable	Enable
Use to buffer write operations using memory. Helps improve the write performance for RAID 5.		
17 DMA Mode	0-5	5
Use to negotiate the highest DMA data transfer mode with the installed disks during initialization.		
18 LBA Mode	Enable/Disable	Enable
Use to enable/disable LBA mode.		
19 Ultra DMA	Enable/Disable	Enable
Use to enable/disable Ultra DMA function.		
1A Performance	Sequential/Random	Random
Use to specify R/W.		

SCSI Params Menu

The SCSI Params menu configures the SCSI ID of the RAID Controller. The SCSI ID and termination must be set to avoid a conflict with the SCSI Host Adapter or other SCSI devices on the bus.

Command Tag Queuing allows a SCSI device to handle multiple requests without having to serialize the operations. This frees the disks to process requests more efficiently.

Sub-Menu	Settings/Options	Default
21 Primary SCSI	0-14, Multiple	0
Use to specify the Primary SCSI ID for controller.		
22 Termination	Enable/Disable	Enable
Use to enable/disable SCSI termination for controller.		
23 TAG Queuing	Enable/Disable	Enable
Allows the controller to handle multiple I/O requests from the Host.		
24 Speed	Ultra3, Ultra2, Fast	Ultra3
Use to specify SCSI speed.		
25 Wide	Enable/Disable	Enable
Use to enable/disable Wide SCSI feature.		
26 LUN Map		
261 LUN 0	Disable, Slice 0-7	Slice 0
262 LUN 1	Disable, Slice 0-7	Slice 1
263 LUN 2	Disable, Slice 0-7	Slice 2
264 LUN 3	Disable, Slice 0-7	Slice 3
265 LUN 4	Disable, Slice 0-7	Slice 4
266 LUN 5	Disable, Slice 0-7	Slice 5
267 LUN 6	Disable, Slice 0-7	Slice 6
268 LUN 7	Disable, Slice 0-7	Slice 7
Use to divide RAID array into multiple logical units.		

Sub-Menu	Settings/Options	Default
22 Secondary SCSI	0-14, Multiple	0

Use to specify the Secondary SCSI ID for controller.

222 Termination	Enable/Disable	Enable

Use to enable/disable SCSI termination for controller.

224 Speed	Ultra3, Ultra2, Ultra, Fast	Ultra3

Use to specify speed of Host SCSI interface.

225 Wide	Enable/Disable	Enable

Use to enable/disable Wide SCSI feature.

226 LUN Map		
2261 LUN 0	Disable, Slice 0-7	Slice 0
2262 LUN 1	Disable, Slice 0-7	Slice 1
2263 LUN 2	Disable, Slice 0-7	Slice 2
2264 LUN 3	Disable, Slice 0-7	Slice 3
2265 LUN 4	Disable, Slice 0-7	Slice 4
2266 LUN 5	Disable, Slice 0-7	Slice 5
2267 LUN 6	Disable, Slice 0-7	Slice 6
2268 LUN 7	Disable, Slice 0-7	Slice 7

Use to divide RAID array into multiple logical units.

RS232 Params Menu

The RS232 Params menu configures the external serial ports of the RAID Controller. The RAID Controller can communicate with a remote terminal (refer to section "*Monitor Utility*" for further information).

NOTE: The RAID Controller and remote terminal must be configured to the same communication settings (baud rate, stop bit, data bit, and parity).

Sub-Menu		Settings/Options	Default
31 Modem Port			
	311 Baud Rate	2400,4800, 9600, 14400, 19200, 28800, 57600, 115200	19200
	312 Stop Bit	1, 2	1
	313 Data Bit	7, 8	8
	314 Parity	None, Odd, Even	None

Use to specify the communication protocol between the controller and external modem. Refer to Table 7 for modem port settings.

Table 7: Modem & Terminal Port Settings

Parameter	Value	Default Value
Baud Rate	2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	19200
Stop Bits	1, 2	1
Data Bits	7, 8	8
Parity	None, Odd, Even	None

32 Terminal Port			
	321 Baud Rate	2400,4800, 9600, 14400, 19200, 28800, 57600, 115200	19200
	322 Stop Bit	1, 2	1
	323 Data Bit	7, 8	8
	324 Parity	None, Odd, Even	None

Use to specify the communication protocol between the controller and remote terminal. Refer to Table 7 for terminal port settings.

System Params Menu

The System Params menu configures the internal operation of the RAID Controller.

Sub-Menu	Settings/Options	Default
41 Password Info		
411 Passwd Check	Disable/Enable	Enable
412 Set Passwd	Up to 8 characters	00000000

Use to enable/disable password check when entering Configuration Mode. Use **412 Set Passwd** *to change the default password.*

42 Pager Info		
421 Paging	Disable/Enable	Disable
422 Pager1 No.	Enter pager # to notify	
4221 Tel No.	16 characters	
4222 Pin No.	16 characters	
423 Pager2 No.	Enter pager # to notify	
4231 Tel No.	16 characters	
4232 Pin No.	16 characters	
424 Code	Enter the code to display on pager	
4241 Part 1.	16 characters	
4242 Part 2.	16 characters	
425 Repeat #	20, 15, 10, 5	5
426 Interval	20, 15, 10, 5	5
427 Page NOW	None	None

Use to enable/disable paging notification in the event of a failure. Up to 2 pagers can be notified with customized codes. Pages can be sent up to 20 times, at intervals of up to 20 minutes. Use the Page NOW option to send an immediate page.

43 FAX Info		
431 FAX	Disable/Enable	Disable
432 FAX Class	1, 2	1
433 FAX1 No.	Up to 16 numbers	
434 FAX2 No.	Up to 16 numbers	
435 Repeat #	20, 15, 10, 5	5
436 FAX NOW	None	None

Use to enable/disable fax notification in the event of a failure. Up to 2 fax machines can be notified. Faxes can be sent up to 20 times. Use the FAX NOW option to send an immediate fax.

Sub-Menu		Settings/Options	Default
44 Company Info			
	String 1	Up to 16 alphanumeric characters	
	String 2	Up to 16 alphanumeric characters	

This information will appear at the top of the fax documents.

45 Modem Init St AT&D0&K4E0

Used to change the initialization command for the modem. Change this option if the default string does not work with your modem.

NVRAM Menu

The NVRAM Menu options control the configuration information. Anytime a configuration change has been made, the NVRAM must also be updated. If a change causes an error or if the controller fails, use the **52 Erase NVRAM** option to restore default settings. Use the "Restart" option to automatically reset the RAID Controller.

NOTES: The RAID Controller should be OFFLINE (disconnected from the host system) when configuring the NVRAM Menu. Any changes made to NVRAM will permanently erase any data on disks!

The RAID Controller must be rebooted before any changes take effect.

Sub-Menu	Settings/Options	Default
51 Update NVRAM	NO/YES	NO

Use to store the settings for all options. Any changes must be saved in NVRAM before taking effect.

52 Erase NVRAM	NO/YES	NO

Use to clear the current settings of NVRAM and restore default settings.

53 Restart	NO/YES	NO

Use to reset the RAID Controller. *The* RAID Controller *must be rebooted before any changes take effect.*

RAID Funcs Menu

NOTE: Any changes made to **61 Format Disk**, **62 Init RAID**, and **63 R5 Check** will permanently erase any data on disks!

Sub-Menu	Settings/Options	Default
61 Format Disk		
611 Format Disk1	Stop/Start	Stop
612 Format Disk2	Stop/Start	Stop
613 Format Disk3	Stop/Start	Stop
614 Format Disk4	Stop/Start	Stop
615 Format Disk5	Stop/Start	Stop
616 Format Disk6	Stop/Start	Stop
617 Format Disk7	Stop/Start	Stop
618 Format Disk8	Stop/Start	Stop

Use to low level format the disks. This option is only available when the RAID Controller is unconfigured. Low level formatting is not mandatory, since most new disks do not require low level formatting. Use only if disk is having problems.

62 Init R5/R3	Stop/Start	Stop

Use to configure a disk group for RAID 3 or 5. This is automatically done during the initial configuration of R5/R3.

63 R5/R3 Check	Stop/Start	Stop

Use to verify the R5/R3 configuration. This option should be performed during the initial configuration of R5/R3.

64 Beeper	Clear, Enable/Disable	Enable

Use to enable/disable the audible alarm.

Sub-Menu	Settings/Options	Default
65 Stop Modem	NO/YES	NO

Use to stop a Page or FAX notification from sending. Use this option to stop receiving the Page or FAX notification after notification has been acknowledged.

66 Add Disk	Disk 1-8	None

Use to add a disk to an existing configuration.

67 Remove Disk	Disk 1-8	None

Use to remove a disk from an existing configuration. Allows the safe shutdown of a potentially faulty disk. The drive will be removed from the configuration and the spare drive (if available) will automatically be added. Once the drive has been removed, use **66 Add Disk** *to add the new disk to the configuration.*

68 Statistic	None	None

Use to view the current settings saved in NVRAM, such as statistical analysis of the R/W operations and percentage of cache hits. This information is only viewable using the Monitor Utility from a remote terminal.

69 Expand Array		
691 1 Disk	NO/YES	NO
692 2 Disk	NO/YES	NO
693 3 Disk	NO/YES	NO
694 4 Disk	NO/YES	NO
695 5 Disk	NO/YES	NO
696 6 Disk	NO/YES	NO
697 7 Disk	NO/YES	NO

Use to expand new capacity.

6A Update ROM	None	None

Use to update the programmable firmware of the RAID Controller. The RAID Controller should be OFFLINE (disconnected from the host system) when using this option.

Expanding the RAID Capacity

The RAID Controller provides a "Capacity Expansion" function, which allows the user to expand current RAID capacity when new disks are added.

NOTE: The capacity of the newly added disk must be at least the same size or larger than the existing online disk capacity.

1. Add the new disk to the RAID system.
2. Turn ON the RAID Controller.
3. Press ***Enter*** to display the Main Menu.
4. Press ↓ until the **06 RAID Func** menu is displayed, then press ***Enter***.
5. Press ↓ until the **69 Expand Array** menu is displayed, then press ***Enter***.
6. Select from Disk 1-7 to expand for RAID capacity, then press ***Enter***.
7. Select YES to verify expand function.
8. Press **Esc** to return to the Main Menu.
9. Press ↓ until the **01 RAID Params** menu is displayed, then press ***Enter***.
10. Press ↓ until the **14 Slice** menu is displayed, then press ***Enter***.
11. Press ↓ until the **142 Slice 1** menu is displayed, then press ***Enter***.

    NOTE: The new expand capacity will require a new slice.

12. The LCD will display the new capacity.

Starting the Monitor Utility

NOTES: Microsoft® Windows® 3.x and Windows® NT™ 3.5x include a program called Terminal which does not support ANSI color. If using either O/S, select VT-100 for terminal emulation or use a third-party software program such as Procomm for Windows.

Microsoft® Windows® 95/98/NT/2000 includes a program called HyperTerminal that supports ANSI color.

The Monitor Utility is implemented with a VT-100 or ANSI terminal connected through the DB9 port on the rear of the DS570 chassis (Figure 14). This utility is embedded in the firmware; software loading is not required unless for upgrade purposes.

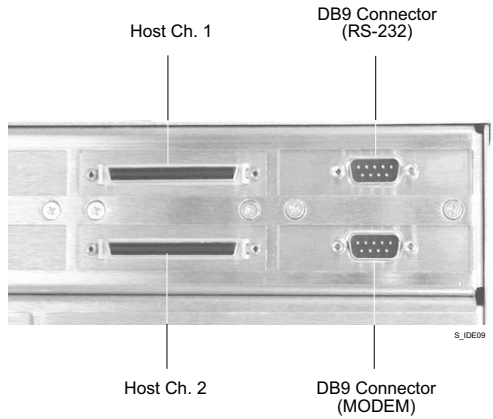


Figure 14: DB9 Port Location

To find HyperTerminal in Windows:

1. Click on **Start** (normally located at the bottom left of the Windows desktop)
2. Go to **Programs**
3. Go to **Accessories**
4. Go to **HyperTerminal**

Set the communications parameters as follows:

Table 8: Terminal Program Communications Parameters

Setting	Value	Default Value
Baud Rate	2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	19200
Stop Bits	1, 2	1
Data Bits	7, 8	8
Parity	None, Odd, Even	None
Flow Control	Software Flow Control (XON/XOFF)	Enabled

S_IDE06

To start the Monitor Utility from the remote terminal (or terminal emulation program), press **Ctrl-D**. This will invoke the Monitor Utility (Figure 15).

At the top of the screen is the Model Number and Firmware version of the RAID Controller. At the left, is the "LCD Display" window. The information displayed here also appears on the front LCD display. Below is the "Menu" window with the Main Menu options. To the right is the "OUTPUT" window that shows more detailed information about the RAID Controller. At the bottom of the screen is the navigation legend.

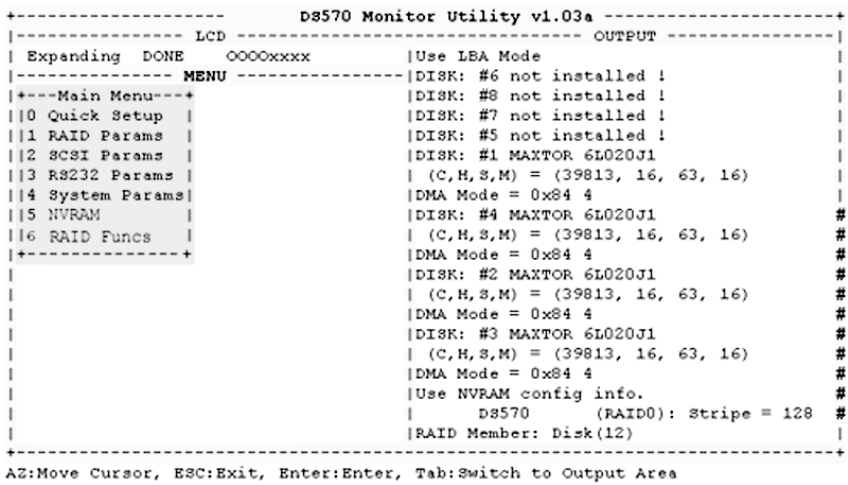

DS570 Monitor Utility v1.03a
LCD
Expanding DONE OOOOxxxx
MENU
Main Menu
0 Quick Setup
1 RAID Params
2 SCSI Params
3 RS232 Params
4 System Params
5 NVRAM
6 RAID Funcs
OUTPUT
Use LBA Mode
DISK: #6 not installed !
DISK: #8 not installed !
DISK: #7 not installed !
DISK: #5 not installed !
DISK: #1 MAXTOR 6L020J1
(C,H,S,M) = (39813, 16, 63, 16)
DMA Mode = 0x84 4
DISK: #4 MAXTOR 6L020J1
(C,H,S,M) = (39813, 16, 63, 16)
DMA Mode = 0x84 4
DISK: #2 MAXTOR 6L020J1
(C,H,S,M) = (39813, 16, 63, 16)
DMA Mode = 0x84 4
DISK: #3 MAXTOR 6L020J1
(C,H,S,M) = (39813, 16, 63, 16)
DMA Mode = 0x84 4
Use NVRAM config info.
DS570 (RAID0): Stripe = 128
RAID Member: Disk(12)
AZ:Move Cursor, ESC:Exit, Enter:Enter, Tab:Switch to Output Area

Figure 15: Monitor Utility Screen

Selecting Menu Options

Configuring the RAID controller via the Monitor Utility is similar to the LCD Display. However, the Monitor Utility allows for easier navigation through the menu system.

Use the following information to navigate through the Monitor Utility menu options:

Table 9: Selecting Menu Options

Menu Options	Press
Exit	Esc
Move Up	↑ or A
Move Down	↓ or Z
Select	Enter
Switch the MENU or OUTPUT screen	Tab

S_IDE05

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APPENDICES

Appendix A - Specifications/Dimensions

Environmental Specifications	Operating	Storage
Ambient Temperature	0° C to 35° C	-40° C to 70° C
Relative Humidity [1]	10% to 80%	10% to 90%
Altitude	-1000 to 10,000 ft -305m to 3048m	-1000 to 40,000 ft -305m to 12195m
Shock [2]	10g	60g

[1] Non-condensing with maximum gradient of 10% per hour.
[2] 11 msec pulse width 1/2 sine wave.

Physical Specifications	Rack Mount
Height	6.98" (177.3mm)
Width	19.00" (482.6mm)
Depth	23.87" (606.3mm) [1]
Weight	67lbs (30.5kg) [2] / 69lbs (31.4kg) [3]

[1] Includes front chassis handles
[2] Total weight for DS560, including DE90s (without drives installed)
[3] Total weight for DS570, including DE110s (without drives installed)

Electrical Specifications	Dual Auto-Ranging 400W Power Supply Modules [1]
AC Input	100-240VAC, 60/50Hz
DC Output Continuous	5V at 21.5 A, 12V at 24.5 A
DC Output Peak	12V at 38 A (15 sec. max)

[1] Dual power supplies operate in shared mode.

Chassis Reliability/Maintainability	
MTBF	250,000 Hours
Preventive Maintenance	Power Supply/Blower Modules

Air Flow	
Total for 2 Blowers	79 CFM

S_IDEspecs1

StorCase DS560/DS570 **SCSI-to-IDE RAID Enclosure**	**8 Bay**
# of BaySupported	8
# of Drive Carriers Included	8
Max. # of Drives Supported	8
Max. Storage Capacity (Based on 120GB Drives)	960GB
Hot Swappable	Yes
LED Status Indicators	Yes
Interfaces	
SCSI Protocol	LVD/SE Ultra160
Transfer Rate	160MB/sec
IDE Protocol	ATA-5
Transfer Rate	100MB/sec
User Interface LED Read-Out and Control Panel	Yes
# of Power Supplies	2
Redundant	Yes
Hot Swappable	Yes
# of Blowers	2
Redundant	Yes
Hot Swappable	Yes
Speed-Variable	High-Low
# of I/Os	2
Max. # of Configurable I/O Channels	2

S_IDEspecs2

StorCase DS560/DS570 **SCSI-to-IDE RAID Enclosure**	
Remote Terminal via RS-232 Port	Yes
Audible Alarm	Yes
Standard 19” Rack-Mount	Height = 4U
Technical Support	Toll-Free
Warranty	3 Years (RAID) 7 years (Enclosure)
Regulatory Approvals	
EMI	FCC/CE/C-tick
Safety Agency	CSA/CSA “US”/TUV

S_IDEspecs3

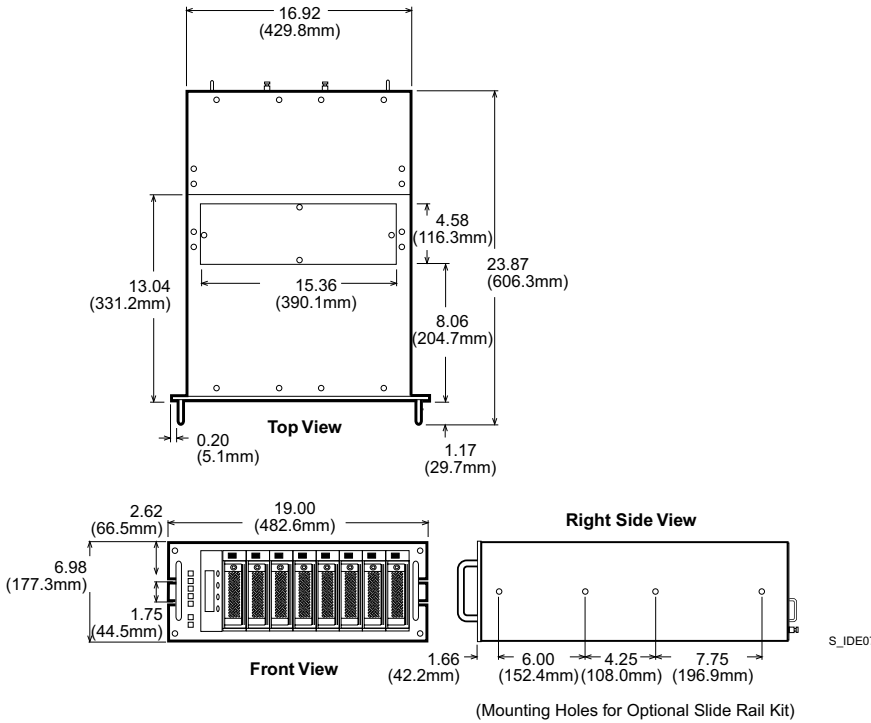

Figure A-1: Physical Dimensions - DS570 Shown
(Dimensions are for reference only)

NOTE: The DS560 and DS570 have same physical dimensional measurements.

Appendix B - Array Basics

The SCSI-IDE RAID Controller allows the set up and management of disk arrays. A disk array is a group of disks that appears to the system as a single virtual disk. This is accomplished through software contained in the RAID controller. RAID (Redundant Array of Independent Disks) refers to disk arrays in which part of the array storage capacity may be used to store redundant information. The redundant information allows the restoration of user data if a disk in the array fails.

The host system views the controller as a single SCSI disk drive. It is actually an array of physical disks behind a RAID controller (it is managed by software to appear as a single physical disk). Depending on the array type, the virtual disk has advantages in fault-tolerance, cost, performance, or a combination of these.

Array Types

Array types are defined by their RAID level, a number from 0 through 5 (a higher RAID level does not necessarily indicate a higher level of performance or fault-tolerance). The RAID Controller allows the user to create the types of arrays proven to be the most useful for RAID applications: RAID 0, 1, 0/1 (also known as mirrored or RAID 10), 3, and 5.

RAID 0 (Striped Disks)

In a RAID 0 array, data is distributed (also known as striped) across the disks in the array. The array appears to the server as one large disk with a capacity approximately equal to the combined capacity of the physical disks. Because multiple reads and writes can be handled in parallel, the input/output performance of the array is much better than that of a single physical disk.

RAID 0 arrays do not store redundant data, so they are not true RAID applications. If one disk fails, the entire array fails and all array data is lost. The fault-tolerance of a RAID 0 is less than that of any single disk in the array. The term RAID 0 is widely used for these arrays however, because they are conceptually similar to true RAID applications.

RAID 1, 0/1, and 10 (Mirrored Disks)

In RAID 1, RAID 0/1, and RAID 10 arrays (commonly referred to as mirrored arrays), disks are paired, with both disks in the pair containing the same data. When data is written to a mirrored array, it is written twice - once to each disk in the pair. A RAID 1 array has only one set of paired disks. A RAID 10 array has multiple pairs, across which data is striped.

The read performance of RAID 1 arrays can be much greater than that of a single disk, while the write performance is slightly lower. In RAID 1/10 arrays, both read performance and write performance are better than those of a single disk.

A mirrored array is also highly reliable, because *both disks in the pair* must fail for the array to fail. For example, an array of five pairs can still maintain integrity even if five disks fail, as long as each pair is left with one good disk. The main disadvantage of a mirrored array is cost. Since all disks must have a twin, twice the number of disks must be used in the array capacity (an eight-disk array contains only four disks of usable capacity).

RAID 3

RAID 3 arrays contain redundant information in the form of parity data, which is calculated block-by-block for all user data. The user data is distributed across all but one of the disks in the array. The parity data is written exclusively to the parity disk (also known as check disk). In the event of a disk failure, the data can be reconstructed from corresponding data stripes on the remaining disk in the array.

RAID 3 provides excellent I/O performance for applications that require high data transfer rates such as image processing, video processing, scientific data collection, batch data processing, or sequential reads and writes.

RAID 5

RAID 5 arrays contain redundant information in the form of parity data, which is calculated block-by-block for all user data. The parity information is distributed across the disks in the array (similar to RAID 0 arrays) and occupies the equivalent capacity of about one disk. Data is interspersed with the parity information. If one disk in the array fails, the data on the failed disk can be reconstructed from the parity data and user data on the remaining disks. Two disks must fail before the entire array fails.

The read performance of a RAID 5 array is excellent, comparable to that of a RAID 0 array. Write performance is lower than that of a RAID 0 array, because write operation involves calculating and writing new parity data as well as writing the new user data.

Mixing Disks from Different Manufacturers or with Different Capacities

An array can contain different models of IDE disks, even disks with different capacities (an array can include a 4GB disk and a 9GB disk). However, if disks with different capacities are mixed, the logical capacity of all other disks in the array is determined by the smallest disk (regardless of RAID level). To maximize disk capacity, use disks of similar size.

Mixing Disks on Different RAID Controller Channels

The RAID Controller Module has two drive channels. An array can consist of disks on different channels of the same RAID controller.

Comparing RAID Levels

Table B-1 illustrates the differences between the various RAID levels.

Table B-1: RAID Level Comparisons

RAID Level	Minimum # of Drives	Description	Pros	Cons
RAID 0	2	Data striping without redundancy	Highest performance	No data protection - if one drive fails, all data is lost
RAID 1	2	Disk mirroring	Very high performance and data protection Good write performance	High redundancy costs - twice the storage capacity is required
RAID 10 RAID 0/1	3	Combination of RAID 0 (data striping) and RAID 1 (mirroring)	Highest performance and data protection (can tolerate multiple drive failures)	High redundancy costs - twice the storage is capacity required
RAID 3	3	Block-level data striping with dedicated parity drive	Excellent performance for large, sequential data requests	Poorly suited for transaction-oriented network applications Single parity drives do not support multiple, simultaneous read/write requests
RAID 5	3	Block-level data striping with distributed parity	Best cost and performance for transaction-oriented networks Very high performance and data protection Supports multiple simultaneous read/writes Can also be optimized for large, sequential requests	Write performance is slower than RAID 0 or RAID 1

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Appendix C - Troubleshooting

StorCase Technical Support

For assistance configuring and using this StorCase product, contact StorCase technical support at (888) 435-5460.

Troubleshooting

• The RAID Controller is not properly identified by the SCSI adapter during initialization of the computer system.

Cause - SCSI ID set for the RAID Controller could be the same ID used by another SCSI device attached to the same SCSI host adapter.

Fix - Select a different SCSI ID for the RAID Controller. Most SCSI host adapters provide onboard ROM BIOS (or software utility) that displays attached devices and their SCSI IDs. Disconnect the RAID Controller from the SCSI host adapter during system boot and note the SCSI IDs already in use.

• The RAID Controller is identified at all SCSI IDs.

Cause - SCSI ID set for the RAID Controller could be identical to the reserved SCSI ID used by the SCSI host adapter.

Fix - Configure the RAID Controller to a different SCSI ID. Most SCSI host adapters reserve SCSI ID7.

• The RAID Controller is not detected by the SCSI host adapter.

Cause - Incorrect termination in the daisy-chain configuration, or possibly a loose SCSI cable.

Fix - For daisy-chain configurations, verify that only the SCSI host adapter and the last SCSI device is terminated.

- **Unable to access the RAID Controller after OS boots up.**

Cause - The RAID Controller might not be configured.

Fix - Verify that the RAID Controller is configured for a RAID level. If no RAID level is configured, the OS will not detect the RAID Controller as a disk.

- **Unable to access the Configuration Mode using the remote terminal (Monitor Utility).**

Cause - The terminal communication settings might not match the settings of the RAID Controller.

Fix - Verify that the terminal communication settings of the remote terminal and the RAID Controller match. Default settings for the RS-232 port is 19200 Baud, 8 Data Bits, 1 Stop Bit, NO Parity, and XON/XOFF Flow Control.

- **Unable to send a Page or FAX using the MODEM port.**

Cause - The Page and FAX options might not be enabled, or the default modem initialization string may not be compatible with your modem.

Fix - Verify that the Page and FAX options are enabled. Change the modem initialization string to match your modem (refer to your modem manufacturer's documention for further information).

The following modem models require their own initialization strings:

Modem Model	Initialization String	Baud Rate	FAX Class
Motorola ModemSURFR V.34 28.8	AT&D\Q1E	Up to 38400	1 & 2
Multitech Multimodem 2834ZDX	AT&D0&E5E0	Up to 38400	2 only
Hayes Accura 288 V.34 + FAX	AT&D0&K4E0	38400 only	1 & 2
Practical Peripherals PM144MT II	AT&K4	Up to 38400	2 only
GVC F-1128V/T2	AT&D0&B1&H2	38400 only	1 & 2
US Robotics Sportster 28800	AT&H2&I1&R1&B1	38400 only	1 only

- **The front panel LCD displays alternating "Zz" characters.**

Cause - This occurs when the cache is full of write request data that has not been processed. The controller will halt requests from the host to flush out data in the cache.

Fix - None required.

- **The front panel LCD displays alternating "Ww" characters.**

Cause - This occurs when write requests in the cache are being processed. The controller will also halt requests from the host.

Fix - Verify that the "Write Buffer" option in the RAID Params Menu is enabled. Increase cache memory if needed.

Error Messages

Error events alert the user of any failures associated with the controller, disk drives, or chassis. When an error event occurs, the problem should be corrected IMMEDIATELY. Table C-1 defines error messages and likely causes.

Table C-1: Error Messages

Error Message	Description
Number of disks found = y, needed = z	Number of disks found (y) does not match the number of disks configured for. Number of disks (z) is required.
Disk x not installed!	Disk (x) is not installed or is unable to be accessed.
Disk x previously removed!	Disk (x) was removed due to a failed disk or by user.
Too many RAID members failed!	The minimum number of disks required for the RAID configuration failed to initialize.
RAID not configured!	RAID cannot be configured due to lack of good disks available or RAID has not been configured.
Disk x format ERROR!	Disk (x) failed during format. Possible bad disk.
Init RAID5 ERROR!	RAID 5 initialization failed. Possible bad disk. Use Disk Check to identify faulty disk.
Disk x add ERROR!	Disk (x) being added failed. Possible bad disk. Use Disk Check to identify faulty disk.
Parity ERROR: blk (a)!	A parity byte was unable to read/write. Blk (a) is the block (sector) on the disks that failed. Possible bad disk.
RAID 5 Check ERROR!	The R5 Check function failed. Possible incorrect RAID configuration or not initialized.

Table C-1: Error Messages (cont'd)

Error Message	Description
ALI modem operations are cancelled!	User stopped modem from sending a page or FAX notification.
Training FAIL!	FAX Class 1 support - modem failed during training phase.
Page transfers FAIL!	Page notification failed. Modem may be OFF or disconnected.
FAX: Modem is busy!	Modem is currently in use and unable to send FAX notification.
Paging: Modem is busy!	Modem is currently in use and unable to send page notification.
Invalid NVRAM	Information stored in NVRAM area is invalid and unable to be used.
No Configuration	RAID Controller is currently unconfigured for any RAID level.
Config ERROR	Current configuration failed verification. Possible bad disk or disk offline.
Not enough Disk	Number of disks required for the RAID level is missing. Possible bad disks or disks offline.
FAIL Fan	Chassis blower failure.
WARN Temp	Inside temperature of chassis too high.

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Reader's Comments

Please take a few moments when your computer system is up and running to send us your ideas and suggestions for improving our products and documentation. Did the installation go smoothly for you? Are there any changes you would like us to make, either with the hardware itself, or with the installation instructions? Everyone at StorCase Technology is working toward the goal of providing you with the highest quality, most cost effective, products available on the market, and we need your comments to guide our efforts. We look forward to hearing from you soon!

Date: _____

_____

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Your Name: _____

Address: _____

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Telephone: ( ) _____

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